

SEQUENCE LISTING

<110> INCYTE PHARMACEUTICALS, INC.

TANG, Y. Tom
 CORLEY, Neil C.
 GORGONE, Gina A.
 GUEGLER, Karl J.
 BAUGHN, Mariah R.

<120> MYOSIN HEAVY CHAIN HOMOLOG

<130> PF-0621 PCT

<140> To Be Assigned

<141> Herewith

<150> 09/187,060; unassigned

<151> 1998-11-05; 1998-11-05

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| Arg | Leu | Pro | Ser | Ile | Arg | His | Trp | Gln | Gly | Pro | Ser | His | Pro | Gly |
| | | | | 20 | | | | | 25 | | | | | 30 |
| Phe | Leu | Gly | Pro | Leu | Phe | Pro | Ile | Cys | Ser | Leu | Gln | Trp | Pro | His |
| | | | | 35 | | | | | 40 | | | | | 45 |
| Gly | Phe | Ser | Ala | Ile | Phe | Pro | Gly | Leu | Leu | Asp | Val | Tyr | Gly | Phe |
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| Glu | Ser | Phe | Pro | Asp | Asn | Ser | Leu | Glu | Gln | Leu | Cys | Ile | Asn | Tyr |
| | | | | 65 | | | | | 70 | | | | | 75 |
| Ala | Asn | Glu | Lys | Leu | Gln | Gln | His | Phe | Val | Ala | His | Tyr | Leu | Arg |
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| Ala | Gln | Gln | Glu | Glu | Tyr | Ala | Val | Glu | Gly | Leu | Glu | Trp | Ser | Phe |
| | | | | 95 | | | | | 100 | | | | | 105 |
| Ile | Asn | Tyr | Gln | Asp | Asn | Gln | Pro | Cys | Leu | Asp | Leu | Ile | Glu | Gly |
| | | | | 110 | | | | | 115 | | | | | 120 |
| Ser | Pro | Ile | Ser | Ile | Cys | Ser | Leu | Ile | Asn | Glu | Glu | Cys | Arg | Leu |
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| Asn | Arg | Pro | Ser | Ser | Ala | Arg | Gln | Leu | Gln | Thr | Arg | Ile | Glu | Thr |
| | | | | 140 | | | | | 145 | | | | | 150 |
| Ala | Leu | Ala | Gly | Ser | Pro | Cys | Leu | Gly | His | Asn | Lys | Leu | Ser | Arg |

| | | | | | |
|-----------------|---------------------|-------------------------|-----|--|-----|
| | 155 | | 160 | | 165 |
| Glu Pro Ser Phe | Ile Val Val His Tyr | Ala Gly Pro Val Arg Tyr | | | |
| | 170 | | 175 | | 180 |
| His Thr Ala Gly | Leu Val Glu Lys Asn | Lys Asp Pro Ile Pro Pro | | | |
| | 185 | | 190 | | 195 |
| Glu Leu Thr Arg | Leu Leu Gln Gln Ser | Gln Asp Pro Leu Leu Met | | | |
| | 200 | | 205 | | 210 |
| Gly Leu Phe Pro | Thr Asn Pro Lys Glu | Lys Thr Gln Glu Glu Pro | | | |
| | 215 | | 220 | | 225 |
| Pro Gly Gln Ser | Arg Ala Pro Val Leu | Thr Val Val Ser Lys Phe | | | |
| | 230 | | 235 | | 240 |
| Lys Ala Ser Leu | Glu Gln Leu Leu Gln | Val Leu His Ser Thr Thr | | | |
| | 245 | | 250 | | 255 |
| Pro His Tyr Ile | Arg Cys Ile Lys Pro | Asn Ser Gln Gly Gln Ala | | | |
| | 260 | | 265 | | 270 |
| Gln Thr Phe Leu | Gln Glu Glu Val Leu | Ser Gln Leu Glu Ala Cys | | | |
| | 275 | | 280 | | 285 |
| Gly Leu Val Glu | Thr Ile His Ile Ser | Ala Ala Gly Phe Pro Ile | | | |
| | 290 | | 295 | | 300 |
| Arg Val Ser His | Arg Asn Phe Val Glu | Arg Tyr Lys Leu Leu Arg | | | |
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| Arg Leu His Pro | Cys Thr Ser Ser Gly | Pro Asp Ser Pro Tyr Pro | | | |
| | 320 | | 325 | | 330 |
| Ala Lys Gly Leu | Pro Glu Trp Cys Pro | His Ser Glu Glu Ala Thr | | | |
| | 335 | | 340 | | 345 |
| Leu Glu Pro Leu | Ile Gln Asp Ile Leu | His Thr Leu Pro Val Leu | | | |
| | 350 | | 355 | | 360 |
| Thr Gln Ala Ala | Ala Ile Thr Gly Asp | Ser Ala Glu Ala Met Pro | | | |
| | 365 | | 370 | | 375 |
| Ala Pro Met His | Cys Gly Arg Thr Lys | Val Phe Met Thr Asp Ser | | | |
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| Met Leu Glu Leu | Leu Glu Cys Gly Arg | Ala Arg Val Leu Glu Gln | | | |
| | 395 | | 400 | | 405 |
| Cys Ala Arg Cys | Ile Gln Gly Gly Trp | Arg Arg His Arg His Arg | | | |
| | 410 | | 415 | | 420 |
| Glu Gln Glu Arg | Gln Trp Arg Ala Val | Met Leu Ile Gln Ala Ala | | | |
| | 425 | | 430 | | 435 |
| Ile Arg Ser Trp | Leu Thr Arg Lys His | Ile Gln Arg Leu His Ala | | | |
| | 440 | | 445 | | 450 |
| Ala Ala Thr Val | Ile Lys Arg Ala Trp | Gln Lys Trp Arg Ile Arg | | | |
| | 455 | | 460 | | 465 |
| Met Ala Cys Leu | Ala Ala Lys Glu Leu | Asp Gly Val Glu Glu Lys | | | |
| | 470 | | 475 | | 480 |
| His Phe Ser Gln | Ala Pro Cys Ser Leu | Ser Thr Ser Pro Leu Gln | | | |
| | 485 | | 490 | | 495 |
| Thr Arg Leu Leu | Glu Ala Ile Ile Arg | Leu Trp Pro Leu Gly Leu | | | |
| | 500 | | 505 | | 510 |
| Val Leu Ala Asn | Thr Ala Met Gly Val | Gly Ser Phe Gln Arg Lys | | | |
| | 515 | | 520 | | 525 |
| Leu Val Val Trp | Ala Cys Leu Gln Leu | Pro Arg Gly Ser Pro Ser | | | |
| | 530 | | 535 | | 540 |
| Ser Tyr Thr Val | Gln Thr Ala Gln Asp | Gln Ala Gly Val Thr Ser | | | |
| | 545 | | 550 | | 555 |
| Ile Arg Ala Leu | Pro Gln Gly Ser Ile | Lys Phe His Cys Arg Lys | | | |
| | 560 | | 565 | | 570 |

Ser Pro Leu Arg Tyr Ala Asp Ile Cys Pro Glu Pro Ser Pro Tyr
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| accacaggtg | tcattgctcac | tcagcctgat | gcccaggctg | ccaagtataa | ggcattggca | 180 |
| ggggcccagc | caccctgggt | tccttgggtcc | cctattcccc | atctgctccc | tgcagtggcc | 240 |
| ccatgggttc | tcgtccatct | tcccaggcct | gctggatgtg | tatggatttg | aatcatttcc | 300 |
| tgacaacagt | ctggaacagt | tgtgcatcaa | ctacgccaat | gagaagctgc | agcagcattt | 360 |
| tgtggctcac | tacctaaagg | cccagcagga | ggaatacgca | gttgagggcc | tggagtggtc | 420 |
| attcatcaac | taccaggaca | accagccctg | tttggatctc | attgagggaa | gccccatcag | 480 |
| catctgctcc | ctcataaatg | aggaatgccg | cctcaatcga | cccagcagcg | cacgccagct | 540 |
| ccagacacgc | attgagactg | ccctggcagg | cagccccctgc | ctgggccaca | ataagctcag | 600 |
| ccgggagccc | agcttcattg | tggtgcatta | tgcggggcct | gtgcgggtacc | acacagcagg | 660 |
| cctggtggag | aagaacaagg | accctatccc | acctgagctg | accaggctcc | tgcagcaatc | 720 |
| ccaggacccc | ctgctcatgg | ggctgtttcc | tactaaccct | aaagagaaga | cccaggagga | 780 |
| acccctggc | cagagcaggg | ccctgtgtt | gaccgtgggt | tccaagttca | aggcctcact | 840 |
| ggagcagctt | ctgcaggctc | tacacagcac | cacgccccac | tacattcgct | gcacaaagcc | 900 |
| caacagccag | ggccaggcgc | agacctttct | ccaagaggag | gtcctgagcc | agctggaggc | 960 |
| ctgtggcctc | gtggagacca | tccatatcag | tgctgctggc | ttccccatcc | gggtctctca | 1020 |
| ccgaaacttt | gtagaacgat | acaagttact | aagaaggctt | catccttgca | catcctctgg | 1080 |
| ccccgacagc | ccatatcctg | ccaaagggct | ccctgaatgg | tgtccacaca | gcgaggaagc | 1140 |
| cacgcttgaa | cctctcatcc | aggacattct | ccacactctg | ccggtcctaa | ctcaggcagc | 1200 |
| agccataact | ggtgactcgg | ctgaggccat | gccagcccc | atgcactgtg | gcaggaccaa | 1260 |
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| gcagtggcgg | gccgtcatgc | tcattccaggc | agccattcgt | tcctgggtta | ctcggaaaca | 1440 |
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| cagaatggcc | tgccctgctg | ctaaagagct | ggatgggtgtg | gaagaaaaac | acttctctca | 1560 |
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| gaaattagtg | gtctgggctt | gcctccagct | ccccaggggc | agccccagta | gctacactgt | 1740 |
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| aaagtttcac | tgcagaaagt | ctccactgcg | gtatgctgac | atctgccctg | aaccttcacc | 1860 |
| ctacagcatt | acaggcttta | atcagattct | gctggaaaga | cacaggctga | tccacgtgac | 1920 |
| ctcttctgcc | ttactggggc | tgggggtgatc | cttgggtgcct | ttgtttccac | aaggcctttt | 1980 |
| cctgccccct | gccttgccaa | agacatttaa | tcagcacaca | gctgccagac | tattcccaca | 2040 |
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| Pro | Asn | Arg | Lys | Lys | Ile | Gly | Ser | Ile | Gln | Tyr | Gly | Arg | Arg | Arg |
| | | | | 20 | | | | | 25 | | | | | 30 |
| His | Ser | Trp | Gln | Gly | Pro | Val | Val | Pro | Ala | Ala | Lys | Leu | Gln | Val |
| | | | | 35 | | | | | 40 | | | | | 45 |
| Leu | Ile | Lys | Gly | Val | Arg | Ile | Trp | His | Arg | His | Pro | Thr | Leu | Val |
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| Trp | Ile | Gly | Ala | Thr | Leu | Glu | Glu | Asp | Ile | Thr | Phe | Gln | Thr | Arg |
| | | | | 65 | | | | | 70 | | | | | 75 |
| Asn | Val | Arg | Ile | Arg | Leu | Glu | Asp | Asp | Thr | Glu | Val | Glu | Tyr | Ala |
| | | | | 80 | | | | | 85 | | | | | 90 |
| Ile | Lys | Ser | Leu | Asp | Gln | Leu | Pro | Phe | Leu | Arg | Asn | Pro | Ala | Phe |
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| Leu | Val | Gly | Lys | Asp | Asp | Leu | Thr | Leu | Leu | Ser | Tyr | Leu | His | Glu |
| | | | | 110 | | | | | 115 | | | | | 120 |
| Pro | Ala | Val | Leu | His | Asn | Leu | Gln | Val | Arg | Phe | Val | Lys | Gly | Ser |
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| Ser | Ile | Tyr | Thr | Tyr | Cys | Gly | Ile | Val | Leu | Val | Ala | Ile | Asn | Pro |
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| Tyr | Ala | Asp | Cys | Ser | His | Ile | Tyr | Gly | Glu | Glu | Ile | Ile | Gln | Val |
| | | | | 155 | | | | | 160 | | | | | 165 |
| Tyr | Arg | Gly | Ala | Gly | Lys | Ser | Ala | Arg | Glu | Met | Asp | Pro | His | Ile |
| | | | | 170 | | | | | 175 | | | | | 180 |
| Phe | Ala | Val | Ala | Glu | Glu | Ala | His | Phe | Asp | Met | Gly | Ala | Phe | Gly |
| | | | | 185 | | | | | 190 | | | | | 195 |
| Lys | Ser | Gln | Ser | Ile | Ile | Val | Ser | Gly | Glu | Ser | Gly | Ala | Gly | Lys |
| | | | | 200 | | | | | 205 | | | | | 210 |
| Thr | Val | Ser | Ala | Lys | Phe | Val | Met | Arg | Tyr | Leu | Ala | Ser | Val | Ala |
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| Ala | Ser | Lys | Thr | Arg | Asn | Gly | Gly | Thr | Thr | Ser | Ile | Glu | Ala | Arg |
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| Val | Leu | Ala | Ser | Asn | Pro | Ile | Met | Glu | Ser | Ile | Gly | Asn | Ala | Lys |
| | | | | 245 | | | | | 250 | | | | | 255 |
| Thr | Ile | Arg | Asn | Asp | Asn | Ser | Ser | Arg | Phe | Gly | Lys | Phe | Ile | Gln |
| | | | | 260 | | | | | 265 | | | | | 270 |
| Ile | Asn | Phe | Cys | Glu | Arg | Gly | Arg | Arg | Ile | Val | Gly | Ala | Glu | Met |
| | | | | 275 | | | | | 280 | | | | | 285 |
| Lys | Thr | Tyr | Leu | Leu | Glu | Lys | Ser | Arg | Leu | Val | Phe | Gln | Ala | Pro |
| | | | | 290 | | | | | 295 | | | | | 300 |
| Gly | Glu | Arg | Asn | Tyr | His | Ile | Phe | Tyr | Gln | Leu | Cys | Ala | Ala | Arg |
| | | | | 305 | | | | | 310 | | | | | 315 |
| Asn | His | Gln | Val | Leu | Lys | Asp | Leu | His | Leu | Gly | Pro | Cys | Glu | Ser |
| | | | | 320 | | | | | 325 | | | | | 330 |
| Tyr | Ser | Tyr | Leu | Thr | Gln | Gly | Gly | Asp | Ser | Arg | Ile | Pro | Gly | Val |

| | | |
|-------------------------------------|-------------------------|-----|
| 335 | 340 | 345 |
| Asp Asp Lys Ala Asp Phe Glu Ala Leu | Leu Lys Ala Leu Gln Leu | |
| 350 | 355 | 360 |
| Leu Gly Phe Asp Glu Lys Gln Met Ser | Asp Val Phe Arg Leu Leu | |
| 365 | 370 | 375 |
| Ala Gly Leu Leu Leu Leu Gly Asn Val | His Phe Glu Asn Gly Glu | |
| 380 | 385 | 390 |
| Gly Ser Ser Ala Val Ser Ala Ser Ser | Cys Gln Glu Ile Ser Arg | |
| 395 | 400 | 405 |
| Leu Cys Arg Glu Phe Trp Lys Ile Ser | Glu Ser Asp Leu Arg Ile | |
| 410 | 415 | 420 |
| Trp Leu Thr Arg Arg Glu Ile Arg Ala | Val Asn Glu Ile Val Thr | |
| 425 | 430 | 435 |
| Lys Pro Leu Thr Lys Asn Glu Ala Val | Arg Ser Arg Asp Ala Leu | |
| 440 | 445 | 450 |
| Thr Lys Met Leu Tyr Ser His Leu Phe | Gly Trp Leu Val Asp Lys | |
| 455 | 460 | 465 |
| Ile Asn Glu Ala Leu Asn Glu Lys Asp | Lys Leu Asp Gly Thr Asn | |
| 470 | 475 | 480 |
| Gln Lys Lys Arg Pro Asp Arg Phe Ile | Gly Val Leu Asp Ile Tyr | |
| 485 | 490 | 495 |
| Gly Phe Glu Thr Phe Asp Val Asn Ser | Phe Glu Gln Phe Ser Ile | |
| 500 | 505 | 510 |
| Asn Tyr Ala Asn Glu Lys Leu Gln Gln | Gln Phe Asn Gln His Val | |
| 515 | 520 | 525 |
| Phe Lys Leu Glu Gln Glu Glu Tyr Ile | Arg Glu Glu Ile Glu Trp | |
| 530 | 535 | 540 |
| Val Arg Val Asp Phe His Asp Asn Gln | Pro Ala Ile Asp Leu Ile | |
| 545 | 550 | 555 |
| Glu Gly Pro Val Gly Met Ile Asn Leu | Leu Asp Glu Gln Cys Lys | |
| 560 | 565 | 570 |
| Arg Leu Asn Gly Ser Asp Ala Asp Trp | Leu Ser Gln Leu Gln Asn | |
| 575 | 580 | 585 |
| Ser Thr Glu Leu Lys Arg Asn Pro Gln | Leu Ala Phe Pro Lys Val | |
| 590 | 595 | 600 |
| Arg Ser Asn Asp Phe Ile Val Arg His | Phe Ala Ala Asp Val Thr | |
| 605 | 610 | 615 |
| Tyr Ser Thr Asp Gly Phe Val Glu Lys | Asn Arg Asp Ala Ile Gly | |
| 620 | 625 | 630 |
| Glu Gln Leu Leu Asp Val Val Val Ala | Ser Lys Phe Pro Phe Ile | |
| 635 | 640 | 645 |
| Arg Thr Val Ile Gly Ser Thr Ala Pro | Thr Ser Val Ser Ser Ser | |
| 650 | 655 | 660 |
| Ser Ser Ser Ser Thr Pro Gly Lys Arg | Thr Ile Lys Lys Thr Val | |
| 665 | 670 | 675 |
| Ala Ser Gln Phe Arg Asp Ser Leu Lys | Glu Leu Met Ser Val Leu | |
| 680 | 685 | 690 |
| Cys Ser Thr Arg Pro His Tyr Val Arg | Cys Ile Lys Pro Asn Asp | |
| 695 | 700 | 705 |
| Ser Lys Ile Ser Phe Asp Phe Glu Pro | Lys Arg Ala Ile Gln Gln | |
| 710 | 715 | 720 |
| Leu Arg Ala Cys Gly Val Leu Glu Thr | Val Arg Ile Ser Ala Ala | |
| 725 | 730 | 735 |
| Gly Phe Pro Ser Arg Tyr Pro Tyr Glu | Glu Phe Ala Arg Arg Tyr | |
| 740 | 745 | 750 |

| | | | |
|---|------|------|------|
| Arg Val Ile Tyr Thr Lys Glu Ala Ala Leu Trp Arg Asp Lys Pro | 755 | 760 | 765 |
| Lys Gln Phe Ala Glu Leu Ala Cys Gln Gln Cys Leu Glu Glu Gly | 770 | 775 | 780 |
| Lys Tyr Ala Val Gly Lys Thr Lys Ile Phe Leu Arg Thr Gly Gln | 785 | 790 | 795 |
| Val Ala Val Leu Glu Arg Val Arg Leu Asp Thr Leu Ala Ala Ala | 800 | 805 | 810 |
| Ala Thr Val Ile Gln Lys Met Trp Lys Gly Phe Leu Ala Arg Arg | 815 | 820 | 825 |
| Lys Tyr Glu Thr Met Arg Arg Ser Leu Leu Ile Val Gln Ala Ser | 830 | 835 | 840 |
| Leu Lys Ala Phe Leu Ala Phe Arg Arg Ile Lys Tyr Leu Gln Met | 845 | 850 | 855 |
| His Arg Ala Val Ile Val Met Gln Ser Ala Val Arg Gly Tyr Leu | 860 | 865 | 870 |
| Glu Arg Arg Lys Tyr Glu Gln Ile Arg Asp Ser Ile Ile Gly Ile | 875 | 880 | 885 |
| Gln Ala Met Phe Lys Ala Asn Arg Val Arg Arg Tyr Val Glu Lys | 890 | 895 | 900 |
| Leu Arg Tyr Glu Lys Ser Ala Ile Thr Ile Gln Ala Ala Trp Arg | 905 | 910 | 915 |
| Gly Tyr Leu Ala Arg Arg Glu Gln Ile Ala Asn Arg Lys Lys Val | 920 | 925 | 930 |
| Val Met Val Gln Cys Ala Val Arg Lys Trp Leu Ala Lys Arg Arg | 935 | 940 | 945 |
| Leu Arg Glu Leu Lys Ile Glu Ala Arg Ser Val Gly His Leu Gln | 950 | 955 | 960 |
| Lys Leu Asn Thr Gly Leu Glu Asn Lys Ile Ile Glu Leu Gln Met | 965 | 970 | 975 |
| Arg Leu Asp Ile Ala Asn Ala Arg Thr Lys Glu Glu Ala Glu Lys | 980 | 985 | 990 |
| Phe Ala Thr Ala Ser Lys Asn Leu Gln Lys Thr Lys Ala Asp Leu | 995 | 1000 | 1005 |
| Ala Met Met Glu Ala Glu Arg Leu Thr Leu Leu Glu Ala Arg Asn | 1010 | 1015 | 1020 |
| Arg Val Glu Val Leu Gln Glu Glu Val Glu Arg Leu Glu Thr Glu | 1025 | 1030 | 1035 |
| Cys Asp Leu Lys Glu Ala Gln Arg Gly Gly Met Glu Thr Lys Met | 1040 | 1045 | 1050 |
| Val Glu Leu Gln Ser Arg Leu Asp Gln Phe Gln Met Gln Ser Glu | 1055 | 1060 | 1065 |
| Ser Gly Gln Thr Ile Val Glu Leu Thr Glu Gln Leu Glu Lys Ala | 1070 | 1075 | 1080 |
| Lys Ala Asp Arg Val Leu Trp Asp Glu Glu Arg Gln Arg Met Glu | 1085 | 1090 | 1095 |
| Ala Ala Leu Asn Thr Glu Arg Ser Ala Arg Asn Ala Leu Asp Ala | 1100 | 1105 | 1110 |
| Glu Met Ala Ala Met Arg Glu Gln Leu Met Lys Asn Val Asp Leu | 1115 | 1120 | 1125 |
| Phe Glu Ser Ser Thr Phe Gln Lys Arg Pro Ser Gln Lys Lys Asn | 1130 | 1135 | 1140 |
| Arg Asp Asp Asp Ser Cys Ser Arg Thr Thr Ser Asn Leu Ser Gln | 1145 | 1150 | 1155 |
| Leu Thr Gly Ser Phe Thr Ala Glu Thr Ile Asn Gly Val His Ser | | | |

| | | |
|---|------|------|
| 1160 | 1165 | 1170 |
| Thr Ser Arg Gly Ser Pro Glu Val Leu Leu Asp Asn Met Ala Ser | | |
| 1175 | 1180 | 1185 |
| Thr Phe Glu Gln Leu Arg Met Ile Asn Asp Leu Arg Gln Arg Asn | | |
| 1190 | 1195 | 1200 |
| Glu His Cys Gln Arg Glu Thr Glu Arg Met Lys Ala Ile Ile Glu | | |
| 1205 | 1210 | 1215 |
| Ala Ser Thr Leu Ile Glu Thr Leu Asp Lys Lys Thr Ser Leu Lys | | |
| 1220 | 1225 | 1230 |
| Ala Phe Glu Ser Ile Arg Val Gly Glu Leu Glu Gly Ala Tyr Asn | | |
| 1235 | 1240 | 1245 |
| Arg Leu Lys Asn Asp Met Glu Arg Leu Val Ser Gly Glu Asn Gly | | |
| 1250 | 1255 | 1260 |
| Ala Thr His Ser Val Phe Glu Arg Ile Met Glu Glu Asn Glu Arg | | |
| 1265 | 1270 | 1275 |
| Leu Arg Glu Glu Ala Val Glu Leu Arg Ser Met Leu Ser Ser His | | |
| 1280 | 1285 | 1290 |
| Phe Glu Lys Gln Ser Val Ala Gly Ser Ser Gly Tyr Arg Arg Ser | | |
| 1295 | 1300 | 1305 |
| Pro Arg Pro Asp Ser Gly His Cys Ser Gly Ala Asp Ser Glu Asp | | |
| 1310 | 1315 | 1320 |
| Gly Ser Ser Gly Ala Asp Leu Glu Glu Asp Leu Cys Ile Glu Arg | | |
| 1325 | 1330 | 1335 |
| Gln Cys Arg His Leu Lys Asn Leu Ala Glu Asn Leu Thr Lys Met | | |
| 1340 | 1345 | 1350 |
| Leu Thr Asn Gln Asn Leu Glu Ile Glu Arg Leu Gln Gln Gln Leu | | |
| 1355 | 1360 | 1365 |
| Arg Phe Ser Glu Ser Gln Thr Val Phe Arg Pro Ser Asp Cys Ser | | |
| 1370 | 1375 | 1380 |
| Leu Asp Glu Ala Val Arg Gly Ala His Lys Gln Thr Gln Leu Leu | | |
| 1385 | 1390 | 1395 |
| Ala Gln Gln Asn Met Asp Leu Asn Asp Lys Leu Thr Arg Gln Ser | | |
| 1400 | 1405 | 1410 |
| Glu Glu Leu Ala Glu Ala Arg Ala Gln Leu Arg Gly Tyr Ser Gly | | |
| 1415 | 1420 | 1425 |
| Pro Leu Gly Leu Glu Asn Ala Ser Asp Glu Glu Ile Ile Arg Leu | | |
| 1430 | 1435 | 1440 |
| Glu Ala Phe Glu Lys Gly Ser Ile Lys His Ser Gly Phe Leu Glu | | |
| 1445 | 1450 | 1455 |
| Val Tyr Asn Val Pro Glu Phe Ala Arg Ile Ile Val Cys Glu Leu | | |
| 1460 | 1465 | 1470 |
| Lys Pro Thr Leu Ala Arg Leu Leu Thr Lys Asn Leu Pro Ala Tyr | | |
| 1475 | 1480 | 1485 |
| Leu Leu Val Ala Ala Phe Arg Asn His Asp Glu Lys Arg Asp Glu | | |
| 1490 | 1495 | 1500 |
| Thr Ala Leu Thr Gly Leu Phe Ser Ser Val His Leu Val Leu Lys | | |
| 1505 | 1510 | 1515 |
| Asp Thr Ile Ser Arg Ser His Asp Leu Asp Leu Leu Ser Leu Trp | | |
| 1520 | 1525 | 1530 |
| Leu Val Asn Leu Trp Arg Leu Phe Asn Leu Leu Arg Gln Tyr Ser | | |
| 1535 | 1540 | 1545 |
| Gly Glu Asp Ser Gln Pro Glu Trp His Val Ala Asn Thr Glu Thr | | |
| 1550 | 1555 | 1560 |
| Gln Asn Ser Tyr Arg Phe Lys Ala Tyr Asp Val Ala Pro Ile Arg | | |
| 1565 | 1570 | 1575 |

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Asp Gln Leu Lys Leu Arg Ile Glu Glu Cys Tyr Thr Ser Leu Met
1580                               1585                               1590
Lys Lys Ala Ile Glu His Val Leu Ser Pro Lys Ile Val Pro Gly
1595                               1600                               1605
Ile Leu Gln His Glu Ser Ser Ser Asp Leu Met Thr Ala Gly Gln
1610                               1615                               1620
Glu Arg Arg Asp Arg Asn Ser Gly Ser Val Glu Ser Gln Arg Lys
1625                               1630                               1635
Ser Leu Asp Asp Leu Leu Gln Phe Met Glu Ile Val His Thr Lys
1640                               1645                               1650
Leu Thr Thr Tyr Gly Gly Asp Asp Ile Val Val Lys Gln Val Ile
1655                               1660                               1665
Gly Gln Met Ala Arg Trp Met Cys Ala Leu Ala Leu Asn Tyr Met
1670                               1675                               1680
Met Phe Arg Arg Glu Leu Cys Asn Phe Glu Lys Ala Ile Gln Ile
1685                               1690                               1695
Lys His Asn Val Thr Gln Ile Gln Asn Trp Leu Asn Ala Lys Gly
1700                               1705                               1710
Leu Ser Asp Cys Arg Asp His Phe Glu Pro Leu Val Gln Ala Cys
1715                               1720                               1725
His Leu Leu Gln Ser Arg Lys Asp Pro Ser Asn Leu Asp Thr Leu
1730                               1735                               1740
Cys Gly Glu Met Thr Ser Arg Leu Lys Pro Arg Gln Val Val Ala
1745                               1750                               1755
Ile Leu Gln His Tyr Asp Pro Ser Asp Glu Met Glu Asp Gly Leu
1760                               1765                               1770
Ser Pro Glu Phe Leu Val Gln Ile Gln Lys Lys Leu Asn Glu Arg
1775                               1780                               1785
Ala Ile Ala Asn Asn Asp Pro Ile Glu Asp Lys Asp Lys Leu Ile
1790                               1795                               1800
Met Leu Gly Thr Tyr Leu Pro Pro Phe Asp Thr Gln Pro Phe Ser
1805                               1810                               1815
Tyr Ser Asp Phe Pro Leu Glu Thr Leu Ser Leu Pro Ser Cys Leu
1820                               1825                               1830
His Met Gln Ser Val Cys Arg Leu Val
1835

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<210> 4

<211> 1120

<212> PRT

<213> Helianthus annuus

<300>

<308> GenBank ID No: g2444174

<400> 4

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Met Asp Arg Val Val Asp Asp Asp Ser Pro Tyr Gly Gln Gly Ser
1      5      10      15
Ser Phe Leu Leu Asn Asp Arg Pro Ser Val Asp Asp Val Asn Asp
20      25      30
Asp Asp Asp Ala Asp Val Asn Pro Ser Val Ser Ala Gln Gly Ser
35      40      45
Val Leu Gly Ser Trp Gly Asn Lys Lys Trp Gly Asp Thr Ala Ser

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| | | |
|---|-----|-----|
| 50 | 55 | 60 |
| Tyr Ile Ala Lys Lys Lys Leu Gln Ser Trp Phe Gln Thr Ser Asp | | |
| 65 | 70 | 75 |
| Gly Asn Trp Glu Leu Ala Lys Ile Leu Ser Ile Thr Gly Ser Glu | | |
| 80 | 85 | 90 |
| Ser Leu Met Ser Leu Ser Glu Glu Lys Val Leu Lys Val Ser Ser | | |
| 95 | 100 | 105 |
| Asp Ser Leu Leu Pro Ala Asn Pro Glu Ile Leu Asp Gly Val Asp | | |
| 110 | 115 | 120 |
| Asp Leu Met Gln Leu Ser Tyr Leu Asn Glu Pro Ser Val Leu Tyr | | |
| 125 | 130 | 135 |
| Asn Leu Gln Tyr Arg Tyr Asp Arg Asp Met Ile Tyr Ser Lys Ala | | |
| 140 | 145 | 150 |
| Gly Pro Val Leu Val Ala Ile Asn Pro Phe Lys Lys Ile Pro Leu | | |
| 155 | 160 | 165 |
| Tyr Gly Ser Asp Tyr Ile Glu Ala Tyr Lys Arg Lys Ser Ile Asp | | |
| 170 | 175 | 180 |
| Asn Pro His Val Tyr Ala Ile Ala Asp Thr Ala Ile Arg Glu Met | | |
| 185 | 190 | 195 |
| Ile Arg Asp Glu Val Asn Gln Ser Ile Val Ile Ser Gly Glu Ser | | |
| 200 | 205 | 210 |
| Gly Ala Gly Lys Thr Glu Thr Pro Lys Ile Ala Met Gln Tyr Leu | | |
| 215 | 220 | 225 |
| Ala Ala Leu Gly Gly Gly Asp Ala Arg Glu Ser Gly Ile Leu Ser | | |
| 230 | 235 | 240 |
| His Asn Gly Cys Arg Thr Pro Arg Arg Ala Glu Ala Phe Gly Asn | | |
| 245 | 250 | 255 |
| Ala Lys Thr Ser Arg Asp Asn Asn Ser Ser Arg Ile Gly Lys Leu | | |
| 260 | 265 | 270 |
| Ile Glu Ile His Phe Ser Glu Thr Gly Lys Ile Ser Gly Ala Lys | | |
| 275 | 280 | 285 |
| Ile Gln Thr Phe Leu Leu Glu Lys Ser Arg Val Val Gln Cys Thr | | |
| 290 | 295 | 300 |
| Asp Gly Glu Arg Ser Tyr His Ser Phe Tyr Gln Leu Cys Ala Gly | | |
| 305 | 310 | 315 |
| Ala Pro Pro Ser Leu Arg Glu Lys Leu Asn Leu Lys Ser Ala Arg | | |
| 320 | 325 | 330 |
| Glu Tyr Lys Tyr Phe Gln Gln Ser Thr Cys Tyr Ser Ile Asn Gly | | |
| 335 | 340 | 345 |
| Val Asp Asp Ala Glu Glu Phe Arg Val Val Val Glu Ala Leu Asp | | |
| 350 | 355 | 360 |
| Ala Val His Val Ser Lys Glu Asn Gln Glu Asn Ala Phe Ala Met | | |
| 365 | 370 | 375 |
| Leu Ala Ala Val Leu Trp Leu Gly Asn Val Thr Phe Ser Ile Val | | |
| 380 | 385 | 390 |
| Asp Asn Glu Asn His Val Glu Pro Ile Ile Asp Asp Ala Leu Leu | | |
| 395 | 400 | 405 |
| Asn Val Ala Lys Leu Ile Gly Cys Glu Ala Asp Asp Leu Lys Leu | | |
| 410 | 415 | 420 |
| Ala Leu Ser Thr Arg Asn Met Lys Val Gly Asn Asp Ile Ile Val | | |
| 425 | 430 | 435 |
| Gln Lys Leu Thr Leu Ala Gln Ala Ile Asp Thr Arg Asp Ala Leu | | |
| 440 | 445 | 450 |
| Ala Lys Ser Ile Tyr Ser Cys Leu Phe Asp Trp Leu Val Glu Gln | | |
| 455 | 460 | 465 |

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|-----------------|---|-----|-----|-----|
| Ile Asn Lys Ser | Leu Ala Val Gly Lys Arg Arg Thr Gly Arg Ser | 470 | 475 | 480 |
| Ile Ser Ile Leu | Asp Ile Tyr Gly Phe Glu Ser Phe Asp Val Asn | 485 | 490 | 495 |
| Ser Phe Glu Gln | Phe Cys Ile Asn Tyr Ala Asn Glu Arg Leu Gln | 500 | 505 | 510 |
| Gln His Phe Asn | Arg His Leu Phe Lys Leu Glu Gln Glu Glu Tyr | 515 | 520 | 525 |
| Ile Gln Asp Gly | Ile Asp Trp Ala Lys Val Asp Phe Glu Asp Asn | 530 | 535 | 540 |
| Gln Asp Cys Leu | Asn Leu Phe Glu Lys Lys Pro Leu Gly Leu Met | 545 | 550 | 555 |
| Thr Leu Leu Asp | Glu Glu Ser Thr Phe Pro Asn Gly Thr Asp Met | 560 | 565 | 570 |
| Thr Phe Ala Thr | Lys Leu Lys Gln His Leu Lys Thr Asn Ser Cys | 575 | 580 | 585 |
| Phe Arg Gly Glu | Arg Gly Lys Ala Phe Thr Val His His Tyr Ser | 590 | 595 | 600 |
| Gly Glu Val Thr | Tyr Asp Thr Ser Gly Phe Leu Glu Lys Asn Arg | 605 | 610 | 615 |
| Asp Leu Leu His | Leu Asp Ser Ile Gln Leu Leu Ser Ser Cys Thr | 620 | 625 | 630 |
| Cys Glu Leu Pro | Gln Ala Phe Ala Ser Asn Met Leu Ser Leu Ser | 635 | 640 | 645 |
| Glu Lys Pro Val | Pro Gly Pro Leu His Lys Ser Gly Gly Ala Asp | 650 | 655 | 660 |
| Ser Gln Lys Leu | Ser Val Val Thr Lys Phe Lys Gly Gln Leu Phe | 665 | 670 | 675 |
| Gln Leu Met Gln | Arg Leu Glu Ser Thr Thr Pro His Phe Ile Arg | 680 | 685 | 690 |
| Cys Ile Lys Pro | Asn Asn Ser Gln Ser Pro Gly Ile Tyr His Gln | 695 | 700 | 705 |
| Gly Leu Val Leu | Gln Gln Leu Arg Cys Cys Gly Val Leu Glu Val | 710 | 715 | 720 |
| Val Arg Ile Ser | Arg Ser Gly Phe Pro Thr Arg Met Ser His Gln | 725 | 730 | 735 |
| Lys Phe Ala Arg | Arg Tyr Gly Phe Leu Leu Leu Glu His Val Ala | 740 | 745 | 750 |
| Ser Gln Asp Pro | Leu Ser Val Ser Val Ala Ile Leu His Gln Phe | 755 | 760 | 765 |
| Asp Ile Leu Pro | Glu Met Tyr Gln Ile Gly Tyr Thr Lys Leu Phe | 770 | 775 | 780 |
| Phe Arg Thr Gly | Gln Ile Gly Lys Leu Glu Asp Thr Arg Asn Arg | 785 | 790 | 795 |
| Thr Leu Asn Gly | Ile Leu Arg Val Gln Ser Cys Phe Arg Gly His | 800 | 805 | 810 |
| Lys Ala Arg Gln | Tyr Met Lys Glu Leu Lys Arg Gly Ile Phe Asn | 815 | 820 | 825 |
| Leu Gln Ala Phe | Ala Arg Gly Glu Lys Thr Arg Lys Glu Phe Ala | 830 | 835 | 840 |
| Ile Leu Val His | Arg His Arg Ala Ala Val His Ile Gln Lys His | 845 | 850 | 855 |
| Ile Lys Ala Lys | Ile Ser Lys Lys Arg Phe Glu Asp Val His Gly | 860 | 865 | 870 |
| Ala Thr Ile Thr | Leu Gln Ala Val Ile Arg Gly Trp Leu Val Arg | | | |

| | | |
|---|------|------|
| 875 | 880 | 885 |
| Arg Cys Ser Gly Asp Ile Ala Leu Leu Gln Phe Gly Ser Gly Lys | | |
| 890 | 895 | 900 |
| Gly Asn Gly Ser Asp Glu Val Leu Val Lys Ser Ser Tyr Leu Ala | | |
| 905 | 910 | 915 |
| Glu Leu Gln Arg Arg Ile Leu Lys Ala Glu Ala Gly Leu Arg Glu | | |
| 920 | 925 | 930 |
| Lys Glu Glu Glu Asn Asp Ile Leu His Gln Arg Leu Gln Gln Tyr | | |
| 935 | 940 | 945 |
| Glu Asn Arg Trp Ser Glu Tyr Glu Leu Lys Met Lys Ser Met Glu | | |
| 950 | 955 | 960 |
| Glu Val Trp Gln Lys Gln Met Arg Ser Leu Gln Ser Ser Leu Ser | | |
| 965 | 970 | 975 |
| Ile Ala Lys Lys Ser Leu Ser Tyr Asp Asp Ser Glu Arg Asn Ser | | |
| 980 | 985 | 990 |
| Asp Ala Ser Ile Asn Thr Ala Asn Asp Glu Thr Asn Pro Pro Trp | | |
| 995 | 1000 | 1005 |
| Asp Ala Ala Thr Asn Gly Arg Arg Asn Gly Val Glu Asn Val Arg | | |
| 1010 | 1015 | 1020 |
| Pro Met Ser Ala Gly Leu Ser Val Ile Ser Arg Leu Ala Glu Glu | | |
| 1025 | 1030 | 1035 |
| Phe Glu Gln Arg Ser Gln Val Phe Gly Asp Asp Ala Lys Phe Leu | | |
| 1040 | 1045 | 1050 |
| Val Glu Val Lys Ser Gly Gln Val Glu Ala Asn Leu Asn Pro Asp | | |
| 1055 | 1060 | 1065 |
| His Glu Leu Arg Arg Leu Lys Gln Met Phe Glu Gly Trp Lys Lys | | |
| 1070 | 1075 | 1080 |
| Asp Tyr Thr Ala Arg Leu Arg Glu Thr Lys Val Ile Leu Asn Lys | | |
| 1085 | 1090 | 1095 |
| Leu Gly His Glu Asp Gly Asp Gly Glu Lys Gly Lys Lys Lys Trp | | |
| 1100 | 1105 | 1110 |
| Trp Gly Arg Leu Asn Ser Ser Arg Val Asn | | |
| 1115 | 1120 | |